Do Now: $y = \frac{-1}{4}x^2 + 2x + 4$

V:

AOS: $x = 4$

vertex: max, $(4,8)$

yint: 4

A:

Y-int: $\frac{-1}{4}(0)^2 + 2(0)$

yint = 4

AOS:

$x = \frac{-b}{2a}$

$= \frac{-2}{2(-1/4)}$

$x = 4$

vertex: $\frac{-1}{4}(4)^2 + 2(4) + 4$

$= 8$

vertex: $(4,8)$

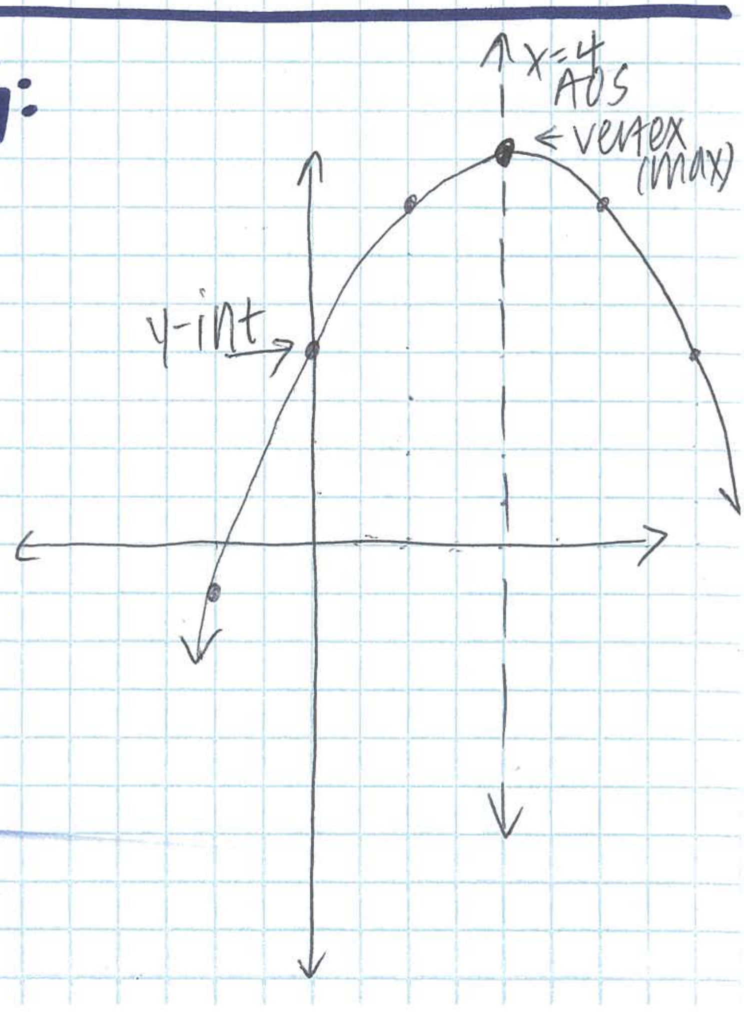
N:

x	y
-4	-8
-2	-1
0	4
2	7
4	8
6	7
8	4

y-int (0, 4)

vertex max (4, 8)

G:

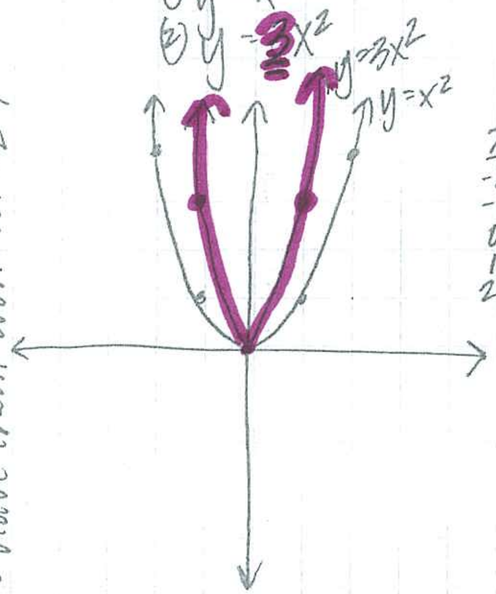


CW#2: Transformations

← do first one w/ students & have them work on #2-4

① Graph:

1. $y = x^2$
2. $y = 3x^2$



x	y
-2	4
-1	1
0	0
1	1
2	4

x	y
-1	3
0	0
1	3
2	12

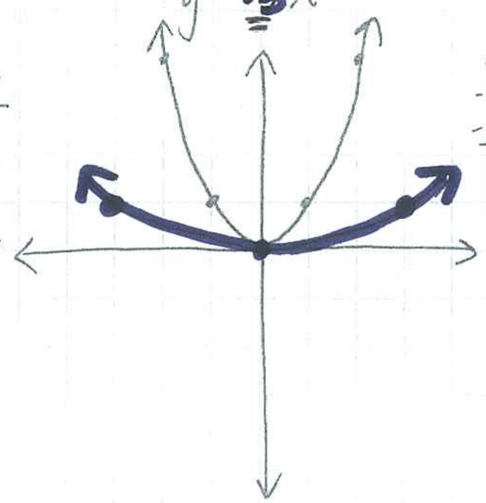
Compare both graphs:
$y=3x^2$ is vertically narrower than $y=x^2$

Why?
we are multiplying our output by 3, so it will rise 3 times as fast

Vocab: This is called a vertical stretch/ horizontal shrink when $|a|>1$

② Graph:

1. $y = x^2$
2. $y = \frac{1}{3}x^2$



x	y
-9	3
-3	1
0	0
3	1
9	3

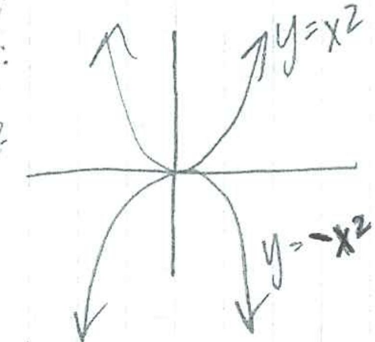
Compare both graphs:
$y=\frac{1}{3}x^2$ is much wider than $y=x^2$

Why?
We are multiplying our output by $\frac{1}{3}$, so it will rise $\frac{1}{3}$ the amount of the original.

Vocab: This is called a vertical shrink/ ~~compression (shrink)~~ horizontal stretch because $0<|a|<1$

③ Graph:

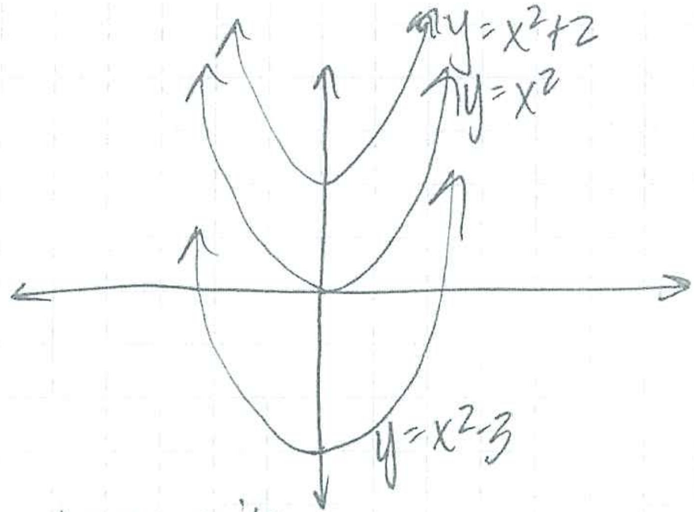
1. $y=x^2$
2. $y=-x^2$



Compare: $y=x^2$ opens up, $y=-x^2$ opens down

Why? the − sign causes all outputs (y-values) to be negative which reflects the parabola

④ Graph:
① $y = x^2$
② $y = x^2 + 2$
$y = x^2 - 3$



<u>compare:</u>
- $x^2 + 2$ moves up by 2 units
- $x^2 - 3$ moves down by 3 units

<u>why?</u>:
we are causing all outputs (y-values) to move up or down.

<u>vocab</u>: shift up (c is positive) or shift down (c is negative)

In summary:

$$y = ax^2 + c$$

① if a is −, the parabola will <u>reflect</u>

② if $|a| > 1$, the parabola will vertically <u>stretch</u> / horizontal shrink

③ if $0 < |a| < 1$, the parabola will vertically shrink/ horizontal stretch

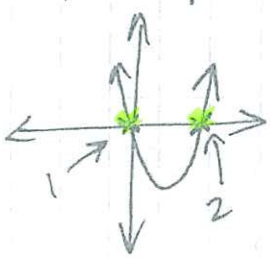
① if c is <u>positive</u>, the parabola will <u>shift up</u>

② if c is <u>negative</u>, the parabola will <u>shift down</u>

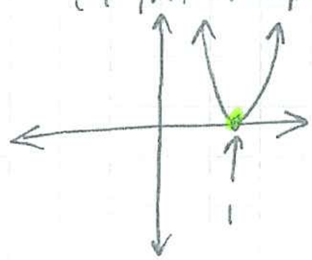
Solving Quadratic Eq'n by Graphing!

We will <u>see</u> our solution(s). They will be the **x-intercepts** of the parabola (when $y=0$)

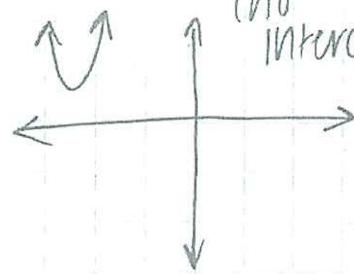
2 solutions
(2 intercepts)



1 solution
(1 intercept)



No real solutions
(no intercepts)



The answer(s) are called solution(s), zero(s), or root(s) of the function.

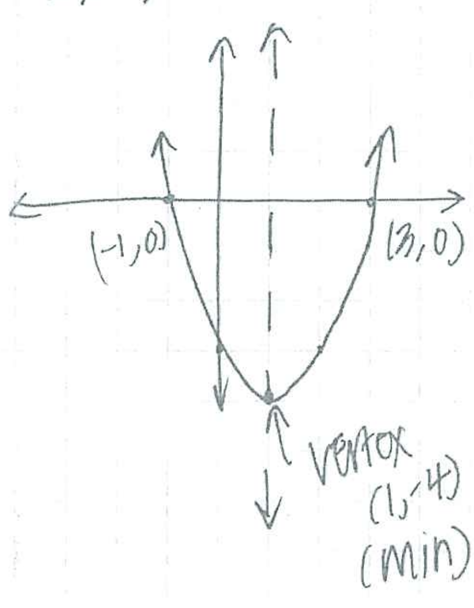
hence when $y=0$!

ex) Solve $x^2-2x=3$ by graphing.

$\rightarrow$ standard form ($y=ax^2+bx+c$)

$x^2-2x-3=0$

X	Y
-1	0
0	-3
1	-4
2	-3
3	0



Solutions/Roots/Zeros:

(-1,0) and (3,0)

AOS = 1

Name: AK

CW#2H: Compare Quadratic Functions & Solve by Graphing

CRS	Algebra Content; XEI 605 Solve quadratic equations
Objectives	1.3 Compare quadratic graphs in form $y = ax^2 + c$ with the parent quadratic function 1.4 Solve quadratic equations by graphing $y = ax^2 + bx + c$

1) Describe the transformation: $y = -7x^2$

- vertical stretch/ horizontal shrink
- reflection

2) How would the graph of the function $y = x^2 + 4$ affected if the function were changed to $y = x^2 - 3$?

A. The graph would shift 4 units up.
B. The graph would shift 3 units down.
C. The graph would shift 7 units down.
D. The graph would shift 4 units to the right.
E. The graph would shift 4 units down.

3) Describe the transformation of $y = 5x^2 - 4$ to the parent function ($y=x^2$).

- vertical stretch/horizontal shrink
- shift down 4

4) How would the graph of the function $y = x^2 - 2$ affected if the function were changed to $y = x^2 + 4$? shift up 6

5) Describe the transformation: $y = -8x^2 + 5$

- reflection
- vertical stretch/horiz shrink
- shift up 5

6) How would the graph of the function $y = x^2 - 2$ affected if the function were changed to $y = x^2 + 1$?

A. The graph would shift 1 unit up.
B. The graph would shift 2 units down.
C. The graph would shift 3 units down.
D. The graph would shift 3 units to the right.
E. The graph would shift 3 units up.

7) Describe the transformation of $y = -x^2 + 7$ to the parent function ($y=x^2$).

- reflection -shift up 7 units

8) How would the graph of the function $y = x^2 + 2$ affected if the function were changed to $y = x^2 - 5$? shift down by 7

9) Describe the transformation of $y = -2x^2 - 4$ to the parent function ($y=x^2$).

- reflection - vert stretch horiz shrink - shift down 4

10) How would the graph of the function $y = x^2 - 6$ affected if the function were changed to $y = x^2 + 2$? shift up 8

11) Describe the transformation of $y = 6x^2 + 8$ to the parent function ($y=x^2$).

- vertical stretch/horiz shrink
- shift up 8

12) How would the graph of the function $y = x^2 + 1$ affected if the function were changed to $y = x^2 + 5$?

- shift up 4

13) Find the zeros of the function: $f(x) = -x^2 + 2x = 1$ $x=1$

14) Find the roots of $x^2 + 7 = 4x$. NO solution

15) Solve the equation by graphing. Label the vertex and axis of symmetry. $y = x^2 - 6x + 8$ $x=2,4$

16) What are the roots of the function $-x^2 - 2x + 3$? Label the vertex and axis of symmetry. $x=-3,1$

$\frac{-b}{2a} = \frac{2}{2(-1)}$

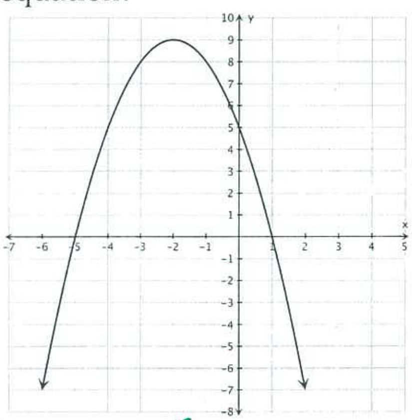
V:(-1,4)

17) How many solutions does the quadratic equation $y = 2x^2 + 12x + 16$ have? Label the vertex and axis of symmetry. $x=-4,-2$

18) Solve the equation by graphing. Label the vertex and axis of symmetry.

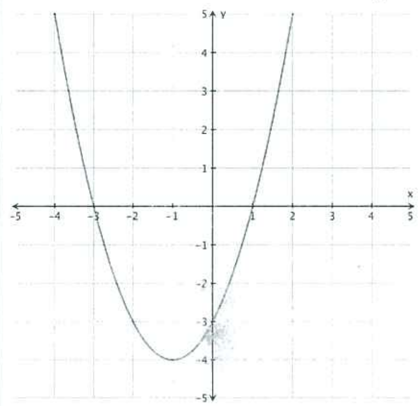
$y = 2x^2 + 8x + 6$ $x=-1,-3$

19) The graph $y = -x^2 - 4x + 5$ is shown below. Which choice best describes the solution(s) to this equation?



A. $x = -5$ ✓
B. $x = 5$
C. $x = 1$ ✓
D. Both A and C

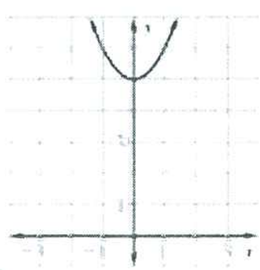
20) The graph of $y = x^2 + 2x - 3$ is shown below. For what values of x does $y = 0$?



A. $x = -1$ *and* $x = 0$
B. $x = -1$ *and* $x = -3$
C. $x = -3$ *and* $x = 1$
D. $x = 1$ *and* $x = 3$

21) Use the graph to find the solution(s) to the equation

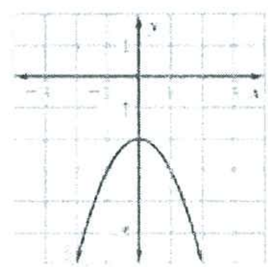
$x^2 + 5 = 0$



No real solutions

22) Use the graph to find the solution(s) to the equation.

$x^2 - 2 = 0$



No real solutions

EXIT SLIP: (on a ½ sheet of graph paper from your notebook):

1) VANG: $-2x^2 - x - 3$. How many solutions? No solution	2) a. Create an equation that has ***two*** transformation from the parent function $y = x^2$. b. Graph both functions. c. Describe the transformations.

Focus. Determination. Pride.